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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/228,772	01/06/1999	JACOB BENESTY	BENESTY21613	8127

7590 07/27/2004

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EXAMINER
SWERDLOW, DANIEL

ART UNIT	PAPER NUMBER
2644	15

DATE MAILED: 07/27/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/228,772	BENESTY ET AL.	
	Examiner	Art Unit	
	Daniel Swerdlow	2644	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *01 June 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *3-10 and 13-16* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *4,6,8,10 and 13-16* is/are allowed.

6)☒ Claim(s) *3 and 5* is/are rejected.

7)☒ Claim(s) *7 and 9* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *01 June 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 1 June 2004 has been entered.

Drawings

1. The drawings were received on 1 June 2004. These drawings are acceptable.

Claim Rejections - 35 USC § 103

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

3. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kanemasa (US Patent 4,621,172) in view of Duttweiler (US Patent 5,951,626). Kanemasa discloses an echo canceller including an adaptive digital filter (Fig. 4, reference 20; column 1, lines 33-34) that corresponds to the adaptive filter utilizing a fast converging adaptive algorithm claimed; a correction coefficient generator (column 4, lines 55-65; column 11, lines 2-4; Fig. 4, reference 50, 54, 56, 58, 60, 62, 64) that corresponds to the modifying means claimed for correcting (i.e., modifying) coefficients (i.e., the algorithm) adaptively (column 4, line 60) using a sign bit extractor and hysteresis (i.e., non-linearity) (Fig. 4, reference 50, 64) and weighting (i.e., scaling)

(Fig. 4, reference 62; column 5, lines 6-8); and interruption of adaptation during double-talk (i.e., a double talk detector for disabling the adaptive filter in response to double talk) (column 10, lines 30-34) when used for speech transmission (i.e., on a telephone circuit). Therefore, Kanemasa anticipates all elements of Claim 3 except the algorithm being PNLMS. Duttweiler discloses use of the PNLMS algorithm (column 1, lines 40-44) in an echo canceller. It would have been obvious to one skilled in the art at the time of the invention to apply the PNLMS algorithm as taught by Duttweiler to the echo canceller taught by Kanemasa for the purpose of providing significantly faster adaptation without sacrificing estimation quality or significantly increasing computational burden (Duttweiler: column 1, lines 44-48).

4. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kanemasa in view of Gay (US Patent 5,428,562). Kanemasa discloses an echo canceller including an adaptive digital filter (Fig. 4, reference 20; column 1, lines 33-34) that corresponds to the adaptive filter utilizing a fast converging adaptive algorithm claimed; a correction coefficient generator (column 4, lines 55-65; column 11, lines 2-4; Fig. 4, reference 50, 54, 56, 58, 60, 62, 64) that corresponds to the modifying means claimed for correcting (i.e., modifying) coefficients (i.e., the algorithm) adaptively (column 4, line 60) using a sign bit extractor and hysteresis (i.e., non-linearity) (Fig. 4, reference 50, 64) and weighting (i.e., scaling) (Fig. 4, reference 62; column 5, lines 6-8); and interruption of adaptation during double-talk (i.e., a double talk detector for disabling the adaptive filter in response to double talk) (column 10, lines 30-34) when used for speech transmission (i.e., on a telephone circuit). Therefore, Kanemasa anticipates all elements of Claim 3 except the algorithm being APA. Gay discloses use of the APA algorithm (column 2,

lines 54-63). It would have been obvious to one skilled in the art at the time of the invention to apply the APA algorithm as taught by Gay to the echo canceller taught by Kanemasa for the purpose of providing fast convergence with low complexity (Gay: column 1, lines 39-42).

Allowable Subject Matter

5. Claims 4, 6, 8, 10 and 13 through 16 are allowed.

6. The following is an examiner's statement of reasons for allowance: Claims 13 through 16 are allowable for reasons stated in the prior Office action mailed on 8 August 2003, paper no. 8.

7. Claims 4 and 6 are rewritten in independent form including all limitations of the base claim and any intervening claims and are allowable for reasons stated in the prior Office action.

8. Claims 8 and 10 are allowable due to dependence from Claims 4 and 6 respectively.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

9. Claims 7 and 9 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

10. Claim 7 claims the filter of Claim 3 wherein the adaptive scaled nonlinearity is given by: $\Psi(|e_n|/s)\text{sign}\{e_n\}s_n$. As stated above apropos of Claim 3, the combination of Kanemasa and Duttweiler makes obvious all elements of that claim. However, the particular formula for the

adaptive scaled nonlinearity claimed is neither anticipated nor made obvious by the prior art. Therefore, Claim 7 is allowable matter.

11. Claim 9 claims the filter of Claim 5 wherein the adaptive scaled nonlinearity is given by: $\Psi(|e_n|/s)\text{sign}\{e_n\}s_n$. As stated above apropos of Claim 5, the combination of Kanemasa and Gay makes obvious all elements of that claim. However, the particular formula for the adaptive scaled nonlinearity claimed is neither anticipated nor made obvious by the prior art. Therefore, Claim 9 is allowable matter.

Response to Arguments

12. Applicant's arguments filed 1 June 2004 have been fully considered but they are not persuasive.

13. Regarding Claim 3, Applicant argues starting on the bottom of page 9 of the response:

> [I]t has been conceded by the examiner that Kanemasa does not describe the use of a PNLMS algorithm, as is recited by claim 3 of the present application. The Examiner has attempted to cure this deficiency through combination with another reference, namely Duttweiler.
> Duttweiler, however, fails to cure this recognized deficiency. Duttweiler describes an adaptive filter that uses a fast converging PNLMS algorithm to distribute energy evenly across a tap (see Duttweiler at FIG. 2 and col. 4, lns. 38-55). Importantly, Duttweiler does not describe an adaptive scaled non-linearity for modifying the adaptive filter coefficients or the use of a double-talk detector with an adaptive filter employing such adaptive scaled non-linearity. Therefore, it is respectfully submitted, one skilled in the art reading Kanemasa would not be motivated to seek a solution in Duttweiler, as they are directed to different problems.

Examiner respectfully disagrees. In this case, both Kanemasa and Duttweiler are directed to solving the problem of echo cancellation using adaptive filtering. Kanemasa teaches the use of scaled non-linearity in processing the error signal in order to improve operation of the adaptive filter in the echo canceller and the use of double-talk detection. Duttweiler teaches that the

PNLMS algorithm is advantageous in an echo canceller, imparting improved convergence speed. As such, one skilled in the art at the time of the invention would have been motivated to utilize the advantageous PNLMS algorithm taught by Duttweiler in the adaptive digital filter of the echo canceller taught by Kanemasa. Further motivation for the combination, as well as evidence of the operability of the combination can be found in Duttweiler, column 4, lines 38-44:

> With this theoretical basis in place and with reference now to FIG. 2, adaptive filter 100 including an embodiment of the present invention is shown in simplified block diagram form. Other than the inventive concept, those skilled in the art will quickly recognize that adaptive filter 100 is broadly similar to the adaptive filter used in echo cancelers disclosed in U.S. Pat. Nos. 3,499,999, 3,500,000, and 4,468,641.

As such, Duttweiler teaches the applicability of the PNLMS algorithm to prior art echo cancellers.

14. Spanning pages 10 and 11 of the response, applicant argues that the PNLMS algorithm taught by Duttweiler "could only logically be inserted in place of the multiplier 62, hysteresis characteristic circuit 64, and absolute value circuit 60 of Kanemasa" thereby resulting in a combination lacking all elements of the claim. Examiner respectfully disagrees. The logical application of the PNLMS algorithm to Kanemasa is in the adaptive digital filter 20 as indicated by the excerpt from Duttweiler cited above.

15. Regarding Claim 5, applicant argues in the second full paragraph on page 13 and the paragraph spanning pages 13 and 14 of the response that because Gay fails to teach an adaptive scaled non-linearity, Kanemasa and Gay are directed to solving different problems. Examiner respectfully disagrees. In this case, both Kanemasa and Gay are directed to solving the problem of echo cancellation using adaptive filtering.

16. In the first full paragraph on page 14 of the response, applicant argues that "if Gay's APA algorithm were to be inserted into the system of Kanemasa ... it would need to be inserted in place of the multiplier 62, hysteresis characteristic circuit 64, and absolute value circuit 60 of Kanemasa" thereby resulting in a combination lacking all elements of the claim. Examiner respectfully disagrees. The logical application of the APA algorithm to Kanemasa is in the adaptive digital filter 20 and summer 22. This is clear from Figs. 1 and 2 in Gay, which show the implementation of the APA algorithm 100 located in the adaptive filter 50 and summer 55 of a conventional echo canceller structure. Further, Gay teaches that the APA algorithm is advantageous in an echo canceller, providing fast convergence with low complexity. As such, one skilled in the art at the time of the invention would have been motivated to utilize the advantageous APA algorithm taught by Gay in the adaptive digital filter of the echo canceller taught by Kanemasa.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Daniel Swerdlow whose telephone number is 703-305-4088. The examiner can normally be reached on Monday through Friday between 8:00 AM and 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Forrester Isen can be reached on 703-305-4386. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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XU MEI
PRIMARY EXAMINER